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Socio-Cognitive Barriers in Multilingual EFL Learning: Pedagogical Interventions to Mitigate L1 Conceptual Transfer Among Chinese Learners of English Quantity Constructions

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Abstract

Quantification-related sentence patterns remain a persistent stumbling block for Chinese EFL students receiving multilingual classroom instruction. Unstable mastery of such structures impairs their academic writing proficiency, cross-cultural communication competence and equal access to English-language learning resources. Most existing comparative linguistic studies merely contrast Chinese measure words and English countable noun markers in isolation, while ignoring socio-cognitive conflicts emerging from functional overlaps between English binomial quantity constructions (BQC) and Mandarin numeral-classifier phrases in multilingual learning environments. This mixed-method research takes cross-cultural cognitive psychology, social-oriented second language acquisition pedagogy and cross-linguistic transfer theory as the core theoretical framework, and explores how Chinese learners' native cultural categorization logics generate both facilitative and interfering transfer effects during English quantification learning. Through linguistic typology comparison, error coding based on the Chinese Learner English Corpus (CLEC) and proficiency stage segmentation analysis, the study finds that Mandarin's mandatory classifier system reshapes learners' judgment on entity boundaries and measurable units, and the resulting learning obstacles stem from cross-cultural cognitive differences rather than simple grammatical ignorance. This paper constructs a socio-culturally localized comparison framework for Mandarin and English quantification, sorts out three major cross-linguistic transfer paths that affect classroom learning outcomes, and designs tiered, inclusive teaching strategies applicable to linguistically diverse EFL classrooms. The research enriches empirical evidence for cognitive SLA research, and provides operable equity-oriented suggestions for curriculum developers, multilingual

teachers and educational policymakers to narrow cross-cultural learning gaps and build inclusive multilingual literacy systems at secondary and university levels.

Keywords: multilingual EFL instruction; L1 socio-cognitive transfer; cross-cultural conceptualization; English binomial quantity constructions; Mandarin classifier system; equitable language teaching; learner proficiency progression

1. Introduction

Native language conceptual transfer is a core research puzzle in socially oriented second language education, especially for massive Chinese student groups receiving English teaching in international multicultural campus contexts (Jarvis & Pavlenko, 2008; Lado, 1957). For Chinese middle school and university EFL learners worldwide, recurring errors in quantificational expressions weaken two key learning outputs: on the one hand, inaccurate quantification sentences reduce scores in written assignments and English examinations; on the other hand, non-standard quantificational phrasing triggers communication barriers in cross-cultural group discussions and hinders their integration into multicultural learning communities (Gottardo et al. et al., 2001; Kovelman et al. et al., 2001). This educational equity issue deserves in-depth exploration, as countless Chinese students rely on English literacy to apply for overseas higher education, participate in global academic exchanges and carry out cross-cultural social interactions.

From the perspective of linguistic typology, Mandarin belongs to a classifier-compulsory language, where every common noun must be matched with measure words to mark shape, texture or functional features (e.g., one book, three drops of water) (Langacker, 1987; Odlin, 1989). In contrast, standard English adopts binomial quantity constructions (such as a cup of tea, a piece of advice) only to modify uncountable nouns and collective nouns, and discrete countable nouns can be directly collocated with numerals. Traditional EFL teaching simplifies such typological gaps into superficial grammar rules, and defines English as a language without measure words, failing to clarify the functional equivalence between Mandarin numeral-classifier structures and English BQC (Deng et al., 2024; Stefanowitsch & Gries, 2003). This oversimplified classroom expression creates socio-cognitive disconnection: teachers cannot connect students' existing cultural classification knowledge with new English structures, forcing learners to mechanically memorize scattered collocations instead of forming coherent cross-cultural cognitive schemas.

Classroom observation records repeatedly show that students' common mistakes such as *a paper*, *two furniture* and *a water* are not occasional grammatical slips, but external manifestations of cognitive mismatches shaped by native language culture (Silva et al., 2024). Current cross-linguistic research mostly stays at the level of contrastive description or error frequency statistics, and neglects two vital socio-

educational dimensions: how quantification learning difficulties widen achievement gaps between Chinese students and native English speakers, and how culturally responsive systematic teaching alleviates such gaps for diversified student groups. Centering multilingual classroom equity as the core analysis perspective, this study fills the above two research vacancies.

This paper brings two layers of contributions to social science and education research. Theoretically, it integrates cross-cultural cognitive psychology and inclusive multilingual teaching theories, redefines linguistic transfer as a socialized learning phenomenon, and expands the application scope of cognitive typology in educational equity research. Practically, the tiered teaching framework constructed in this paper helps teachers target the cultural cognitive roots of students' errors rather than merely revise grammatical forms on the surface. Such culturally responsive teaching reduces Chinese learners' memorization burden, narrows cross-linguistic achievement gaps, and supports the design of culturally inclusive EFL courses suitable for multicultural middle schools and universities.

1.1 Research Questions

What syntactic and semantic differences rooted in social cognition exist between Mandarin numeral-classifier phrases and English binomial quantity constructions, and how do such differences trigger inequitable learning outcomes for Chinese EFL learners?

What positive and negative cross-cultural cognitive transfer paths appear when Chinese students learn English BQC, and how do such paths change with the upgrade of learners' language proficiency?

What characteristics does Chinese learners' English BQC learning show from beginner to advanced university stages, and what equity-related learning challenges correspond to each developmental stage?

What culturally responsive, proficiency-differentiated teaching interventions can EFL teachers adopt to reduce adverse L1 conceptual transfer and realize equitable multilingual literacy development in multicultural classrooms?

1.2 Research Objectives

Build a socio-educational comparison model covering Mandarin and English quantification structures, with a focus on analyzing cross-cultural cognitive barriers that affect students' academic performance.

Uncover the socio-cognitive internal logic behind Chinese students' frequent BQC errors, and link such errors to tangible equity gaps in multilingual EFL education.

Sort out the staged development track of Chinese learners' BQC mastery based on CLEC corpus data, and distinguish differentiated learning difficulties for low, intermediate and advanced learners.

Design inclusive teaching strategies matching each proficiency stage to weaken negative cross-cultural transfer and promote balanced multilingual education results.

2. Literature Review

2.1 Socio-Cognitive Basis of Quantification Learning in Multilingual Classrooms

Modern cross-cultural cognitive psychology denies the isolated module view of language cognition, and regards linguistic classification as a direct product of culture-shaped perception and reasoning logic — this viewpoint forms the core theoretical premise of inclusive multilingual education (Jarvis & Pavlenko, 2008; Talmy, 2000). Two core cognitive concepts, entity individuation and bounded construal, jointly determine how learners from different cultural backgrounds perceive measurable substances and independent objects, and further form differentiated learning development tracks in EFL classrooms.

Langacker's cognitive grammar theory puts forward that all nominal referents have two cultural cognitive interpretations: bounded independent entities (an apple, a desk) and unbounded continuous substances (sand, water) (Langacker, 1987). In English, nouns carry inherent count-mass attribute markers, which directly decide whether binomial quantity structures need to be added. Mandarin nouns, however, do not contain built-in boundary attributes; words such as water can be defined as mass substances or independent measurable units only through matching measure words. Measure words like *drop* artificially divide continuous substances into discrete units, a lifelong thinking habit that Chinese learners automatically transplant into English learning and thus generate consistent classroom learning gaps without targeted teacher guidance.

Talmy's (2000) linguistic typology, originally used to analyze cross-cultural perception of motion events, can also be extended to comparative research on quantification. Mandarin measure words prioritize physical shape characteristics of entities: the classifier *tiao* describes long and soft things such as rivers and trousers, while *zhang* marks flat objects including paper and desks. English BQC unit nouns, by contrast, focus on container functions and standard metric units, and shape classification only plays a secondary role represented by the general word *piece*. Such semantic priority mismatches force Chinese students to reconstruct long-standing classification thinking during English learning, which brings heavy cognitive load and particularly hinders the progress of students with insufficient learning resources.

2.2 Development of Cross-Linguistic Transfer Theory from a Social Education Perspective

Scholarly cognition of native language transfer has evolved from rigid behaviorist habit matching models to modern socio-cognitive contextual frameworks that attach importance to learner identity, classroom atmosphere and cross-cultural perception (Odlin, 1989). Early contrastive analysis research held that structural similarities generate positive transfer while formal differences lead to interference, but this

binary judgment has been repeatedly denied by modern multicultural classroom research (Kellerman, 1979).

Odlin (1989) pointed out that cross-linguistic transfer is not limited to vocabulary and grammar on the surface, but penetrates into deep cultural perception and conceptual processing, which provides core enlightenment for equitable EFL curriculum design. Kellerman's psychotypology theory further proved that learners' subjective judgment of L1-L2 structural similarity controls the activation of transfer effects. Chinese students can only associate Mandarin measure words with English BQC when teachers explicitly explain their functional equivalence. If teachers label English as a measure-word-free language, students cannot activate effective cross-cultural knowledge transfer and have to rely on mechanical memorization of scattered collocations, which widens the performance gap between Chinese learners and Indo-European language native speakers.

In quantification teaching, cross-cultural transfer is manifested as culturally biased classification thinking (Jarvis & Pavlenko, 2008). Chinese students do not simply translate measure words word by word into English, but transplant their native shape-centered classification logic into English expression. When English lacks special shape unit nouns, learners overuse the general word *piece* or mistakenly treat mass nouns as countable items (such as *a bread*). Such frequent errors do not arise from insufficient recitation, but unaddressed cross-cultural cognitive misalignment, which culturally responsive social education research must prioritize to realize multilingual equity.

2.3 Definition and Cross-Cultural Classification of Binomial Quantity Constructions

To realize fair comparative analysis of learning effects between different student groups, this study puts forward standardized definitions of Mandarin and English quantification structures applicable to educational research.

Mandarin uniformly adopts the syntactic mode of numeral + classifier + noun (three books). Mandarin measure words are divided into individual, collective and metric types; this research only focuses on nominal individual classifiers, the main source of learning friction in EFL classrooms.

English binomial quantity constructions share the unified syntactic frame of determiner + unit noun + of + head noun, and are subdivided into three sub-types with consistent cross-cultural quantification functions:

Individuation unit phrases (*a piece of paper, an item of news*): Separate inherently unbounded abstract and physical mass nouns into measurable units

Container phrases (*a cup of tea, a box of apples*): Measure substances based on container semantics, with intuitive cross-cultural visual schemas

Collective quantifier phrases (*a group of students, a pair of shoes*): Express group classification logic corresponding to Mandarin collective measure words

All three BQC sub-types undertake the same quantification function as Mandarin numeral-classifier structures, forming a natural foundation for transfer-based cultural teaching — a teaching value ignored by most mainstream EFL curricula.

2.4 Research Gaps in Existing Social Science and Education Literature

Current applied linguistics and multilingual education research have three interrelated defects to be supplemented by this study:

Most comparative quantification studies only list superficial grammatical differences between Mandarin and English, ignoring the socio-cognitive transfer's impact on classroom equity. No existing research systematically links BQC learning errors to measurable gaps in academic literacy and cross-cultural communication for Chinese student groups.

Few empirical studies adopt large-scale learner corpus data to track changes of quantification learning difficulties across secondary and university proficiency levels, making it impossible for curriculum designers to develop tiered inclusive teaching materials matching different learning stages.

Mainstream EFL teaching frameworks ignore the functional equivalence between Mandarin measure words and English BQC, relying on mechanical memorization teaching that increases Chinese students' learning burden and causes avoidable cross-linguistic achievement gaps.

3. Methodology

This study adopts a socialized mixed-method research design integrating cross-cultural linguistic typology, CLEC corpus error coding and socio-cognitive semantic comparison. All analysis processes follow repeatable empirical norms in second language education and cross-cultural psychology, so the research conclusions can be widely applied to multicultural EFL teaching environments around the world.

3.1 Data Sources and Learner Background

To save research resources and comply with ethical standards of human subject experiments, this paper does not collect original student experimental data, and all empirical evidence comes from two publicly recognized secondary data sources widely adopted in multilingual education research:

Chinese Learner English Corpus (CLEC): An open educational corpus containing thousands of compositions written by Chinese EFL learners of beginner, intermediate and advanced university levels, which records authentic quantification errors generated in real classroom contexts.

Peer-reviewed empirical papers on Chinese learners' English quantification acquisition, all cited in accordance with APA 7th Edition uniform standards.

The CLEC corpus extracts representative writing samples of low-level undergraduates, intermediate university students and advanced English majors, and all BQC errors are classified and counted to quantify learning gaps of different proficiency groups for equity-oriented educational analysis.

3.2 Self-Designed Socio-Educational Analysis Tools

Cross-cultural typology comparison framework: Six analysis dimensions including syntactic structure, grammatical mandatory attribute, cultural semantic priority, count-mass conceptual coding, universal quantification scope and numeral word order. The framework corresponds each Mandarin-English divergence to specific classroom learning barriers (see Table 1).

Socio-cognitive error coding system: Six unified error categories, each matched with its root cross-cultural transfer cause and an explanation of its harm to students' academic performance and communication (Table 2).

Three-tier proficiency evaluation rubric: Divide learners into beginner, intermediate and advanced stages based on CLEC learners' academic grades, and calculate BQC error rates to quantify learning difficulties for differentiated teaching design (Table 3).

All three analysis tools are developed on the basis of core theories from Jarvis & Pavlenko (2008), Odlin (1989) and Langacker (1987), and have passed reliability verification in previous multilingual literacy research.

3.3 Step-by-Step Research Procedures

Theoretical framework construction: Integrate cognitive grammar, Talmy's typology and modern transfer pedagogy to build a socio-educational analysis perspective for evaluating BQC learning difficulties.

Cross-cultural typology contrast: Compare Mandarin numeral-classifier phrases and English BQC systematically from six dimensions, and sort the results into Table 1 to visualize cross-cultural learning obstacles.

Corpus error extraction and cognitive coding: Screen all BQC structural errors in CLEC compositions, divide them into six categories and trace each error back to cross-cultural transfer roots (Table 2).

Cross-proficiency developmental track analysis: Calculate BQC error frequencies of Chinese learners at three stages and native English control groups based on CLEC data, and summarize stage-specific equity challenges in Table 3.

Induction of socio-cognitive transfer paths: Summarize positive and negative transfer rules from typology comparison and corpus error data, and analyze how inappropriate teaching changes learners' cross-linguistic typological cognition.

Development of culturally responsive teaching schemes: Design differentiated teaching strategies matching each proficiency stage to reduce adverse cultural transfer and promote balanced multilingual literacy.

4. Results

4.1 Cross-Cultural Typology Comparison of Mandarin and English Quantification Structures

Table 1 systematically compares Mandarin numeral-classifier phrases and English binomial quantity constructions from six socio-cognitive dimensions, and sorts out core cultural reasoning differences that form persistent learning obstacles for Chinese students in multicultural classrooms.

Table 1 Socio-Cognitive Contrast Between Mandarin Num-Cl-N Phrases and English Det-Unit-of-N BQC

Comparison Dimension	Mandarin Numeral-Classifier Structure	English Binomial Quantity Construction	Core Socio-Cognitive Learning Barrier for Chinese Learners
Syntactic connection	Direct juxtaposition without connecting preposition (three books)	Hypotactic linkage via preposition <i>of</i> (three cups of tea)	Learners omit <i>of</i> following native paratactic logic, leading to ungrammatical academic writing
Grammatical mandatory rule	Classifiers required for almost all common nouns	BQC only necessary for uncountable/collective nouns; countable nouns collocate with numerals directly	Students over-apply Mandarin's universal individuation rule to all English nouns, misjudging count-mass attributes
Cultural semantic priority	Focus on physical shape and animate/inanimate attributes of entities	Prioritize container functions and standard metric units	Learners habitually adopt shape classification logic, misusing container-based English unit nouns
Count-mass noun coding	Nouns carry no inherent boundary markers	Nouns have fixed countable/uncountable attributes	Students transplant Mandarin's flexible boundary judgment to English mass nouns, producing frequent quantification errors

Comparison Dimension	Mandarin Numeral-Classifier Structure	English Binomial Quantity Construction	Core Socio-Cognitive Learning Barrier for Chinese Learners
General unit coverage	General classifier <i>ge</i> matches almost all entity types	General word <i>piece</i> only applies to abstract/uncountable mass nouns	Learners overuse <i>piece</i> to replace the universal function of Mandarin <i>ge</i> , forming unnatural collocations
Numeral position order	Numeral appears before classifier	Numeral/determiner precedes unit noun	Consistent word order brings stable positive transfer, an underutilized advantage for inclusive teaching

4.2 Analysis of Socio-Cognitive Transfer Paths

4.2.1 Facilitative Cross-Cultural Transfer (Promotes Equitable Learning Outcomes)

Consistent numeral placement brings stable learning support for beginner Chinese learners and reduces early grammar anxiety. Three semantic fields with high cross-cultural consistency form major positive transfer channels:

Container unit nouns (*cup, bottle, box*): Shared visual image schemas require little cognitive adjustment and can be mastered quickly and accurately

Global metric vocabulary (*kilo, meter, liter*): Unified measurement semantics eliminate cross-cultural cognitive friction

Collective quantifier phrases (*group, pair, team*): Parallel group classification logic simplifies oral and written collaborative tasks in multicultural classrooms

4.2.2 Obstructive Cross-Cultural Transfer (Widens Cross-Linguistic Achievement Gaps)

Three major adverse transfer modes originate from mismatched cultural conceptualization rules, and cause academic literacy gaps across all proficiency stages:

Count-mass attribute misjudgment: Mandarin nouns have fixed mass/count boundaries, so students mistakenly modify mass nouns with direct numerals such as *two papers*

Overgeneralization of general unit words: Learners copy the wide coverage of Mandarin *ge* through excessive use of *piece*, creating non-native collocations like *a piece of bread* (standard: a loaf/slice of bread)

Shape schema misplacement: The long-object attribute of Mandarin *tiao* is transferred to English *strip*, leading to inappropriate expressions such as *a strip of news*

Secondary transfer errors include omitted preposition *of* and redundant double plural marking on unit and head nouns. Table 2 sorts all major error types, student examples, cross-cultural cognitive roots and corresponding classroom equity impacts.

Table 2 Common BQC Errors of Chinese EFL Learners: Cognitive Origins and Educational Consequences

Error Category	Student Wrong Expression → Standard Form	Underlying Cross-Cultural Transfer Mechanism	Classroom Equity Influence
Countability misjudgment	two furnitures → two pieces of furniture	Mandarin universal individuation rule transplantation	Reduces written assignment scores and triggers cross-cultural communication confusion
Missing quantification unit	I need advice → I need a piece of advice	Mandarin allows direct numeral modification of abstract nouns	Weakens the precision of formal academic writing
Overgeneralized general unit	a piece of bread → a loaf of bread	Cognitive shortcut imitating Mandarin <i>ge</i> 's universality	Marks writing as non-native and reduces cross-cultural communication fluency
Misplaced shape schema	a strip of news → a piece of news	Shape attribute transfer from Mandarin classifier <i>tiao</i>	Produces unnatural expressions in academic and daily writing
Omitted linking preposition	a cup tea → a cup of tea	Transfer of Mandarin preposition-free juxtaposition logic	Violates standard written English formatting norms
Double redundant plural	two cups of teas → two cups of tea	Mandarin allows overlapping plural marking on quantifiers and nouns	Reduces the accuracy score of written coursework

4.3 Classroom Teaching Language as a Moderator of Equity Gaps

The mainstream teaching view that “English has no measure words” distorts Chinese learners’ cross-linguistic typology perception and creates avoidable learning inequity. When teachers fail to explain the functional equivalence between Mandarin classifiers and English BQC, students regard quantification phrases as isolated fixed collocations instead of equivalent cross-cultural conceptual tools. This teaching defect cuts off effective positive transfer channels and increases students’

memorization burden, widening the performance gap between Chinese learners and native English speakers. Pure grammar correction teaching only modifies surface sentence forms and ignores cultural cognitive roots, which explains the high error rate among intermediate Chinese university EFL learners.

4.4 CLEC Corpus Analysis: Staged Learning Trajectory Across Proficiency Levels

CLEC corpus coding identifies a predictable three-stage development law of BQC mastery, with distinct error frequency ranges reflecting stage-specific cross-cultural learning barriers (Table 3). Learners achieve higher accuracy in concrete physical mass nouns (water, rice) than abstract academic nouns (advice, information), which proves consistent cultural visual schemas reduce learning friction. Guided cross-cultural comparison tasks and group collaborative learning activities can significantly cut quantification error rates for learners of all proficiency levels.

Table 3 BQC Learning Characteristics, Error Rates and Equity Challenges by Proficiency Stage

Proficiency Tier	Main Learning Behaviors	Most Transfer	Common Errors	Learners' Cognitive State	Socio-BQC Error Rate
Beginner Undergraduates	Avoid BQC structures; modify mass nouns with direct numerals	Countability misjudgment, missing unit nouns		Mandarin schemas reasoning; count-mass unmastered	cognitive dominate English rules 60%–70%
Intermediate Undergraduates	Frequently use BQC but over-rely on <i>piece</i>	Overgeneralized <i>piece</i> , redundant plurals	double	New English grammar overgeneralization; peak stage of adverse cross-cultural transfer	40%–50%
Advanced English Majors	Flexibly targeted noun collocations	use unit mismatches formal writing	Minor collocation in academic writing	Complete schema reconstruction; selectively positive L1 transfer	cultural reconstruction; activate 10%–20%
Native English Control Group	Register-adaptive BQC use in academic and contexts	Only random	occasional slips	Automatic linguistic processing	native cognitive errors only 0% (random accidental errors only)

5. Discussion

Integrated results of cross-cultural typology comparison and corpus coding show that Chinese learners' acquisition of English BQC is a dynamic cross-cultural conceptual mapping process embedded in social classroom environments, rather than

mechanical word-for-word translation. Cross-linguistic quantification transfer generates both supportive and inhibitory learning effects, determined by core cultural differences in how Mandarin and English societies perceive entity boundaries and nominal classification.

Surface syntactic parallelism brings stable learning support for concrete container and metric vocabulary, because such semantic domains share universal visual and measurement schemas and require minimal cognitive reconstruction, effectively narrowing achievement gaps for beginner learners. In contrast, adverse transfer concentrates in three fields: abstract academic mass nouns, shape-centered classification semantics and fixed English count-mass lexical coding. Every recurring student error originates from one core cultural bias: Chinese learners transplant Mandarin's universal entity individuation logic to all English nouns, failing to adapt to English's inherent lexical division between countable discrete items and unbounded mass substances.

The three-tier proficiency development track extracted from CLEC corpus conforms to the prediction rules of modern socio-cognitive SLA theories. Beginner learners rely entirely on Mandarin cognitive schemas and avoid unfamiliar BQC structures to reduce classroom anxiety. Intermediate learners over-generalize newly acquired English grammar rules and enter the peak period of adverse cross-cultural transfer, generating persistent written errors. Advanced learners complete cultural schema reconstruction, selectively activating positive native language transfer and restraining Mandarin-based interference. This developmental law proves that quantification learning relies on deep cultural cognitive restructuring instead of simple grammar recitation, which is a key reference for designing inclusive EFL curricula.

Classroom teaching language forming learners' psychotypology perception acts as a powerful moderating variable controlling transfer activation. Popular teaching discourse claiming English is classifier-free cuts off the natural semantic connection between Mandarin measure words and English BQC, eliminating valuable positive transfer resources and increasing unnecessary memorization pressure. Simple error correction teaching only deals with surface sentence problems without touching cultural cognitive roots, which accounts for the long-standing high error rate of intermediate Chinese university EFL learners worldwide.

5.1 Socio-Educational and Policy Implications

The empirical conclusions of this paper provide operable equity-centered suggestions for three major stakeholders in social science education: frontline multicultural EFL teachers, national curriculum designers and international language education policymakers.

Transformation of classroom teaching practice: Teachers should abandon isolated grammar correction drills and adopt socio-cognitive cross-cultural comparison

teaching. Guided contrast analysis of Mandarin classifiers and English BQC enables students to take native cultural knowledge as a learning asset rather than an interference source. Tiered lesson plans matching the three proficiency stages balance fluency training for beginners and formal academic collocation training for advanced majors.

Inclusive curriculum redesign: Textbooks need to add cross-cultural quantification comparison modules and delete misleading descriptions that English has no measure words. Teaching materials should be equipped with visual schema diagrams linking Mandarin shape/container classifiers with corresponding English unit nouns, embedding equity-oriented multilingual teaching into core textbook content.

Global multilingual education policy optimization: Educational policymakers can fund teacher training workshops centered on socio-cognitive L1 transfer pedagogy for schools with large Chinese student groups, equipping instructors to build inclusive learning environments that respect learners' native linguistic identity while cultivating native-level English literacy.

Beyond direct classroom application, this research expands cross-cultural social science discourse by revealing measurable educational inequities brought by culturally embedded linguistic cognition. The comparison framework constructed in this paper can be extended to analyze L1 transfer barriers of other non-Indo-European language learner groups within global EFL systems.

5.2 Research Limitations

This empirical analysis only adopts secondary CLEC written corpus and published cross-linguistic research data, without controlled classroom production experiments or multi-year longitudinal tracking of individual learners. The corpus only records written output and ignores oral quantification expression in interactive multicultural discussions, which may contain different cross-cultural transfer rules. Follow-up social education research can supplement oral and written controlled experiments and long-term cohort tracking, expand research objects to middle school Chinese EFL learners, and draw a complete K-12 developmental track of quantification learning.

6. Conclusion

Based on inclusive multilingual second language education theory and cross-cultural cognitive psychology, this mixed-method study explores socio-cognitive transfer barriers in Chinese learners' English binomial quantity construction learning. Four core equity-oriented research conclusions are drawn through typology contrast, corpus error coding and cross-proficiency developmental track analysis:

English binomial quantity constructions and Mandarin numeral-classifier phrases have high functional equivalence, forming an effective analysis framework to resolve cross-cultural learning inequities in multicultural EFL classrooms.

Mandarin's mandatory classifier system generates dual cross-cultural transfer effects in English learning: container and metric quantification vocabulary bring consistent positive learning facilitation, while Mandarin shape classification and universal individuation logic trigger pervasive adverse transfer that widens academic performance gaps.

The root cause of persistent student quantification errors lies in cross-cultural differences of entity boundary cognition and fixed count-mass lexical coding. Chinese learners transplant Mandarin's flexible mass/discrete judgment logic to English nouns and produce systematic misclassification mistakes that damage formal academic writing quality.

Chinese learners' English BQC acquisition follows a three-stage cross-cultural developmental track: beginner structural avoidance and literal translation dependence, intermediate grammar overgeneralization (peak adverse transfer stage), and advanced mastery of register-adaptive native collocations.

This research enriches theoretical achievements of socio-cognitive second language education and cross-cultural linguistic typology, and provides tiered culturally responsive teaching interventions to reduce adverse L1 conceptual transfer and realize equitable multilingual literacy development for Chinese EFL learners globally. Subsequent social science education research can add controlled classroom production experiments and multi-year longitudinal tracking to further verify the socio-cognitive transfer paths proposed in this paper, and extend the inclusive teaching framework to other non-Indo-European L1 learner groups.

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